VIA MEDICA

SPECIAL ARTICLE

Anaesthesiology Intensive Therapy
2018, vol. 50, no 5, 330–332
ISSN 1642–5758
10.5603/AIT.2018.0044
www.ait.viamedica.pl

The genesis of anaesthesia in prehistory

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The history of anaesthesia may be divided into two periods:

I — ancient and medieval times, called the "pre-anaesthetic" or "primitive anaesthesia" period when there were no anaesthetics, only intoxicating agents. The period lasted from ancient times until October 16, 1846.

II — the modern period since 1846, when William Thomas Morton demonstrated that ether could alleviate the pain of surgical operations.

Although surgical anaesthesia was not known in ancient and medieval times, the issue of pain relief in surgical patients was of interest. The term anaesthesia was already known (from Greek *anaisthétos*, meaning "without sensation", "absence of emotions" "insensibility") and was first used by Plato in 400 BC [1, 2].

In ancient and medieval times, pain was relieved with chemical agents, e.g. herbal extracts (in the form of infusions) and alcohol (mainly wine) [3]. The first historical fact in this regard can be found in Babylonian tablets (about 2500 BC), describing the way to prepare a cement containing henbane (*Hyoscyamus niger*) for the painless filling of carious defects [4].

From 2000 BC and the initial centuries of the Christian era, the use of mandrake root extracts for painful wounds, which was recommended by Hippocrates (460 BC), Cornelius Celsius (about 35 BC), Galen (about 120AD) and Avicenna (980 AD).

Chinese physicians (4th and 3rd centuries BC) used Indian hemp extracts while in ancient Egypt, poppy extracts were applied. In *The Odyssey*, Homer called opium the juice of oblivion. One should note that already in the 8th century BC, a Poppy Goddess was being depicted on Crete.

About 1200 AD, *Ugo de'* Borgognoni da *Lucca* (an expert medical doctor based in Bologna) prepared cocktails containing opium, mulberry, jimsonweed, Indian hemp and mandrake and soaked sponges with them ("sleeping sponges"), which he placed below the patient`s nose (the first "anaesthetising tools").

Opium, a wonderful analgesic and anaesthetic agent, was called laudanum by Paracelsus (1493-1541), that is "something to be praised", and was used in the form of inhalation powders, tablets or in combination with alcohol (Fig. 1).

Moreover, pain was relieved with physical methods. In 1050 AD patients were immersed in bathtubs with cold water (pre-history of hypothermia), covered with ice, placed on snow or had quickly evaporating substances poured all over them (e.g. ether and chloroform). Additionally, attempts were made to exert pressure on the nerve trunks (Ambroise Paré, 1509–1590; and Benjamin Bell, 1749-1806). The methods of cooling patients and nerve compressions were those applied for the longest period of time as they were most rational [6]. Furthermore, psychological measures to affect

Figure 1. Phillippus Aureolus Theophrastus Bombastus von Hohenheim Paracelsus (1493–1541) [5]

pain were attempted. The practices of Franz Anton Mesmer, who developed mesmerism (1766), are well known. Putting patients into a trance was supposed to render them insensitive to pain. In 1784, however, this practice was prohibited.

All the agents and methods mentioned above were poorly effective and often caused death due to overdosing. The methods of precise dosing and determining the amount of active substances in preparations were not known [7]. However, the general attitudes of individuals in the Middle Ages are worth stressing. Medieval philosophy advocated the acceptance of pain as a kind of punishment for sins and a sign of bravery.

During this period, surgery was considered a craft. Surgeons had to be confident and self-controlled while using a knife, despite the pain and screams of their patients. The rule of quick surgery was obeyed (thigh enucleation: 40 seconds, limb amputation: several seconds). Fainting was expected both by patients and physicians; moreover, massive bloodlettings were performed before surgery [8].

Two examples may illustrate the resilience to pain of medieval patients. The first concerns Prince Dedo of Saxony, who wanted to accompany King Henry VIII to Italy and underwent the cosmetic removal of excess fat (he could not mount a horse). He died several hours after the procedure. The second example concerns Prince Leopold V who sustained a complicated crural fracture. He was treated with ointments and dressings; unfortunately, gangrene set in and he ordered his servant to amputate his limb with an axe without anaesthesia; the following day, he died [9].

The beginnings of inhalation anaesthesia go back to 1272, when the first reports about an intoxicating substance ("sweet oil of vitriol") discovered by Raimondus Lullus can be found. In the 15th century, the above-mentioned Paracelsus observed that chickens fed with grains soaked in vitriol oil fell asleep. In the same period, Valerius Cordus, a German botanist and chemist, also discovered vitriol oil. In 1730, Frobenius, a London apothecary, confirmed the sleep-inducing properties of the oil and called it ether oil. However, the agent was not used in humans [10].

In 1776, Joseph Priestley (an English chemist) discovered nitrous oxide (N_2O), which was also independently discovered by Scheele, a Swedish apothecary. Humphrey Davy (a chemist) used this agent as an analgesic for his headaches and toothaches. He called it "laughing gas". In 1844, Horace Wells, a dentist, extracted a tooth under N_2O; the next attempt of using N_2O conducted in Boston in front of numerous witnesses failed and Wells was ridiculed [11].

In 1839, Alfred Velpeau, a famous French surgeon, presented his opinion on surgical pain in the sentence *Éviter la douleur dans la chirurgie est une chimêre, qu'elle n'est plus permie de poursuivre aujourd'hui* (Avoidance of pain in surgery is an illusion that cannot be succumbed to). A similar opinion was presented by Seweryn Gałązkowski (a Vilnius surgeon). Fortunately, they were both wrong [12].

Figure 2. William Morton [13]

In January 1842, William E. Clarke used ether during a tooth extraction in New York. Three months later, Crawford Long, an American surgeon, anaesthetised the patient undergoing the removal of a sebaceous cyst on the neck by putting a handkerchief soaked in ether over his nose and mouth. However, these facts were not published.

The beginnings of professional anaesthesia are associated with the experiments carried out by Charles Jackson (a physician, chemist and geologist from Boston) in the years 1841–1842. He and William Morton (his student and also a dentist) inhaled a mixture of ether and air.

On October 16, 1846, ether was used for the first time at a public demonstration for removing a maxillary tumour; the procedure was performed by John Collins Warren on a young printer Gilbert Abbot in a Boston Hospital. Morton attracted attention of the papers and received the prize money in 1853, which led to a conflict between the scientists [13] (Fig. 2).

The fate of the first anaesthetists was tragic. Horace Wells, who could not accept that some other people had gained recognition, became addicted to chloroform and committed suicide by cutting open an artery in 1848. William Morton, despite the prize money he had received earlier, died in poverty in New York due to alcohol addiction, while Charles Jackson descended into madness and died at the age of 75 years in a psychiatric hospital in 1880 [7].

In 1831, chloroform was discovered, while in 1847, James Simpson, a surgeon and an obstetrician from Edinburgh, first used the vapours of chloroform on himself and then for anaesthetising women during labour.

Figure 3. Francis Hoeffer McMechan ([21], image courtesy of Wood Library Museum of Anesthesiology, Parkridge, Il)

John Snow (1813–1858), a London physician dealing exclusively with anaesthesiology, anaesthetised Queen Victoria with chloroform during two deliveries. Chloroform became a strong competitor of ether, with the technique of its use being extremely simple [14].

Due to the high toxicity of chloroform, confirmed later, it subsequently disappeared from operating rooms (in the early 20th century) [15, 16].

Already by the Middle Ages, inhalational agents had been used for recreation (paintings in Australian and Mexican Caves, Greek and Persian writings), and news about such properties of nitrous oxide and chloroform spread rapidly, especially among the upper classes. In the mid-19th century, parties with chloroform and nitrous oxide became fashionable, even special taverns were opened. Nitrous oxide was sold at parties organised by students of medicine, during popular music concerts (the gas being placed in special balloons) [17].

At the beginning of the 19th century, several anaesthetics were available, although the methods of administration and dosing were not fully known. Anaesthetics revolutionised surgery and the beliefs that pain had to accompany each surgical procedure were overcome. Successful reports regarding painless surgeries spread first in Europe and then worldwide; a new era of anaesthesia had begun [18, 19].

The words of Mieczysław Wyględowski, a surgeon, are noteworthy; he stressed the role of human dreams in anaesthesia (e.g. a futuristic vision of Icarus — planes and the conquest of space). In his book, he writes: "if it weren't for the 'dream' of drugs relieving pain, inducing sleep and enabling painless surgical procedures, modern medicine would be in the Dark Ages, despite the vast technological advances in innovative drugs" [20].

Francis Hoeffer McMechan, a famous anaesthesiologist living at the turn of the 19th and 20th centuries, dreamed about a global, worldwide society of anaesthesiologists. Although he was severely ill and did not live to witness the accomplishment of his vision, it eventually came true with the foundation of the World Federation of Societies of Anaesthesiologists in 1955 [21, 22] (Fig. 3).

ACKNOWLEDGEMENTS

1. Source of funding: none.
2. Conflict of interest: none.

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